Articles

Health Care Professionals' Willingness to Do Mouth-to-Mouth Resuscitation

B. ZANE HOROWITZ, MD, *Portland, Oregon, and* LEONA MATHENY, RN, MN, *Sacramento, California*

To assess the willingness of physicians and nurses with training in basic cardiac life support to provide mouth-to-mouth resuscitation in both hospital and out-of-hospital settings, we surveyed all attendees at a monthly advanced life support course over a 1-year period. Of 622 attendees, 379 (61%) responded to our survey describing a variety of cardiac arrest scenarios. Less than half of the participants surveyed were willing to do mouth-to-mouth resuscitation on an unknown adult, male or female, who had collapsed in a supermarket. Overall, the group was willing to do mouth-to-mouth resuscitation on victims known to them: their neighbors (84%), children at a pool (88%), spouses (94%), and parents (93%). In the hospital setting, knowing a patient's human immunodeficiency virus (HIV) status greatly influenced the willingness to do mouth-to-mouth rescue. If a patient's HIV status was unknown, only a third of providers would do mouth-to-mouth resuscitation; if the HIV status was known to be negative, two thirds would do mouth-to-mouth resuscitation ($P < 0.002$), Children in the hospital whose HIV status was unknown would receive mouth-to-mouth resuscitation by 57% of the respondents. Children known to be HIV-negative would be resuscitated by 79% of the respondents. Co-workers were more willing to resuscitate a known physician or nurse than an unknown co-worker, with physicians more willing than nurses to do mouth-to-mouth resuscitation on an unknown co-worker. A third of the group has performed mouth-to-mouth resuscitation previously. Although an increased percentage of this subgroup was willing to provide mouth-to-mouth in all adult hospital scenarios, experienced providers of mouth-to-mouth wanted to receive mouth-to-mouth resuscitation less frequently (75%) than inexperienced providers (84%) ($P = 0.02$). The self-reported willingness to provide mouth-to-mouth resuscitation is influenced by patient characteristics; as the level of familiarity with the victim decreased, so did the willingness of the health care professional to do mouth-to-mouth.

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The first link in the chain of resuscitation is effective early cardiopulmonary resuscitation (CPR), which includes mouth-to-mouth resuscitation.[1,2] In an era wherein transmissible diseases such as the acquired immunodeficiency syndrome (AIDS) and hepatitis deter many lay people from performing mouth-to-mouth resuscitation, we wondered how health care professionals would respond to an unexpected need to start mouth-to-mouth resuscitation on someone. Although we encourage the use of a pocket mask for protection, as recommended by the Centers for Disease Control and Prevention,[1] we know that a health care professional may encounter a situation in which a response is required and no protective mask is available. Would physicians and nurses be more likely to do mouth-to-mouth resuscitation in a public place, such as a swimming pool or a supermarket, or when they were on duty in a hospital? Would knowing the victim's human immunodeficiency virus (HIV) status matter? Would a child evoke a better response than an adult?

To answer these questions, we selected a group of health care professionals with training in basic CPR and posed a series of scenarios to them. We compared the responses of physicians and nurses and those who had previously done mouth-to-mouth resuscitation with those who had not. The self-reported attitudes of health care professionals at an urban California teaching medical center are described in our report.

From the Division of Emergency Medicine and the Center for Continuing Nursing and Medical Education, University of California, Davis, Medical Center, Sacramento; and the Oregon Poison Center, Oregon Health Sciences University, Portland.

Reprint requests to B. Zane Horowitz, MD, Oregon Poison Center, Mail Code CB 550, Oregon Health Sciences University, 3181 SW Sam Jackson Park Rd, Portland, OR 97201-3098.

TABLE 1.— *Willingness of Physicians and Nurses to Provide Mouth-to-Mouth Resuscitation on Patients in a Hospital*

Patient Description	Survey Respondents			P Value
	Overall, %	MDs, %	RNs, %	
Man: HIV- and hepatitis-negative				
Medical floor	62	67	61	0.38
Surgical floor	64	67	63	0.57
Woman: HIV- and hepatitis-negative				
Medical floor	65	67	64	0.69
Surgical floor	64	67	63	0.62
Male: unknown				
Medical floor	36	36	37	0.81
Surgical floor	35	36	36	0.97
Female: unknown				
Medical floor	35	36	37	0.86
Surgical floor	35	36	36	0.97
Pediatric patient				
HIV- and hepatitis-negative	79	78	80	0.71
HIV or hepatitis unknown	57	55	60	0.39

HIV = human immunodeficiency virus.

Subjects and Methods

Advanced cardiac life support (ACLS) courses were given on a monthly basis by the University of California, Davis, Center for Continuing Nursing and Medical Education, an affiliate member of the Golden Empire Chapter of the American Heart Association. All students enrolled in the ACLS courses between May 1994 and June 1995 were given a survey form on registering. As a prerequisite for enrolling in the course, a current basic cardiac life support (BCLS) card was required; therefore, all persons answering the questionnaire were trained to do mouth-to-mouth resuscitation. Although answering the questionnaire was not required of any course participants, they were encouraged during all coffee breaks to complete and turn it in. Of a total of 622 course participants, 379 returned completed questionnaires, for a return rate of 61%. Descriptive statistics were performed using Excel (Microsoft). Pearson's χ^2 analysis was done using the Statistical Package for the Social Sciences.

Results

Of the 379 participants in ACLS courses who completed a questionnaire, 78 (20%) were physicians, 238 (63%) were nurses, and 63 (17%) were a diverse group that included paramedics, pharmacists, respiratory therapists, and other medical personnel. All participants held a degree in a field that provides health care.

Of the entire group, 47% and 49%, respectively, were willing to do mouth-to-mouth resuscitation on an unknown man and an unknown woman who collapsed in a supermarket. The physicians as a group were more willing to do mouth-to-mouth than the nurses, although this percentage did not reach statistical significance (56% versus 44%, $P = 0.075$). Overall, respondents were more willing to do mouth-to-mouth on victims known to them. They would perform mouth-to-mouth on a neighbor (84%), a child at a public swimming pool (88%), and a child in their own backyard pool (92%). There was no statistical difference between physicians and nurses in these scenarios.

In the case of a person who had collapsed on the street and was presumed to be homeless, only a few would perform mouth-to-mouth resuscitation on an adult (21% on a homeless man, 22% on a homeless woman). Most, however, would still do mouth-to-mouth on an apparently homeless child (55%). Of those who would not perform mouth-to-mouth resuscitation, all acknowledged that they would stop and call 911 for assistance.

In scenarios involving patients in a hospital, striking consistencies were found between physicians and nurses (Table 1). When presented with a male or a female patient on either medical or surgical floors who was known to the professional through their medical record to be negative for HIV and hepatitis, two thirds of all respondents would begin mouth-to-mouth resuscitation if no pocket mask were available. When the scenario was altered to a patient with unknown HIV or hepatitis status, only a third of health care professionals would initiate mouth-to-mouth resuscitation. Most respondents would wait until resuscitation equipment arrived. There was no statistical difference between physicians and nurses in these cases ($P = 0.81$ for male patient; $P = 0.86$ for female patient).

Given a scenario involving a child, most health care professionals would begin mouth-to-mouth resuscitation even without knowing the patient's HIV or hepatitis status. Overall, 57% would do mouth-to-mouth on an unknown child on a pediatric ward, with 79% willing to do so if they knew the child to be negative for HIV and

TABLE 2.—*Effect of Experience on the Willingness to do Mouth-to-Mouth Resuscitation: Prior CPR Providers and Never-CPR Providers*

Patient Description	Performed CPR			P Value
	Overall, %	Prior, %	Never, %	
Supermarket				
Man	47	52	44	0.139
Woman	49	56	46	0.058
Homeless person				
Man	21	25	19	0.178
Woman	22	25	20	0.291
Child	55	61	52	0.085
Man: HIV- and hepatitis-negative				
Medical floor	62	70	58	0.031*
Surgical floor	64	73	59	0.008*
Woman: HIV- and hepatitis-negative				
Medical floor	65	72	61	0.030*
Surgical floor	64	72	59	0.016*
Man: unknown				
Medical floor	36	42	33	0.087
Surgical floor	35	41	32	0.084
Woman: unknown				
Medical floor	35	41	33	0.117
Surgical floor	35	41	32	0.084
Pediatric patient				
HIV- and hepatitis-negative	79	84	76	0.107
HIV or hepatitis unknown	57	60	56	0.451

CPR = cardiopulmonary resuscitation, HIV = human immunodeficiency virus.

*Statistically significant.

hepatitis. Nurses were slightly more likely than physicians to perform mouth-to-mouth resuscitation on children, but the difference did not reach statistical significance (60% versus 55% for unknown child, $P = 0.39$; 80% versus 78% for known child, $P = 0.71$).

Although most health care professionals would respond to the aid of a co-worker who required mouth-to-mouth resuscitation, a known co-worker would more likely receive mouth-to-mouth resuscitation than an unknown co-worker. Whereas 74% and 72%, respectively, would do mouth-to-mouth resuscitation on a nurse or physician known to the health care professional, overall 60% and 57%, respectively, would do mouth-to-mouth on an unknown nurse or physician who collapsed at work. Physicians were statistically more willing than nurses to do mouth-to-mouth resuscitation both on a physician they never worked with before (79% versus 58%, $P = 0.009$) and on a nurse they never worked with before (76% versus 58%, $P = 0.006$).

When asked if they had ever performed mouth-to-mouth resuscitation, 34% of the ACLS class participants said they had. When this subgroup was analyzed as to their willingness to do mouth-to-mouth resuscitation compared with the group who had never performed it, the experienced group was more willing to do mouth-to-mouth *in all the* scenarios given. This reached statistical significance only in adult scenarios where the HIV status of the patient was known (Table 2). The only scenario in which the previous mouth-to-mouth provider answered affirmatively less often than the never-done mouth-to-mouth group is if they wanted mouth-to-mouth resuscitation done on themselves. Overall, 80% wished to have mouth-to-mouth resuscitation done if they collapsed, but whereas 84% of participants who had never done mouth-to-mouth desired it for themselves, only 75% of those who had previously done it wanted someone else to do it to them if the need arose ($P = 0.021$).

In scenarios in which a parent or spouse collapsed and required CPR, nearly all responders in all subgroups said they would begin mouth-to-mouth resuscitation (93% to 96%). When asked if their spouse or housemate knew CPR, 71% responded that they did, with nurses living with a trained CPR provider (76%) more often than physicians (63%) ($P = 0.010$).

Discussion

The decision to do mouth-to-mouth resuscitation is a personal one influenced by a variety of factors. In our study, most health care professionals would hesitate to perform mouth-to-mouth resuscitation on a homeless adult, an unknown patient, and to a lesser degree, on an adult who collapsed in a supermarket. But perhaps

because of the younger age and the reflexive response a sick child evokes from health care professionals, most would not hesitate to perform mouth-to-mouth on a child in or out of a hospital, even if the child's HIV status was unknown.

Respondents to our survey were asked to provide optional written comments. Most comments noted a fear of acquiring AIDS, HIV infection, hepatitis, tuberculosis, and herpes in their decision not to do mouth-to-mouth resuscitation in some cases. A few qualified their response that they would normally do mouth-to-mouth unless they saw blood, vomit, or open lesions in the airway. Some physicians or nurses felt that CPR training carried with it a responsibility to do mouth-to-mouth resuscitation or felt a moral responsibility to always do it. Still others commented that they always carried a pocket mask so that they could respond appropriately and administer mouth-to-mouth resuscitation.

Among respondents unwilling to do mouth-to-mouth, they wrote that they thought that the code team response was fast enough that they would rather wait until the proper equipment arrived before beginning CPR. Those who would withhold mouth-to-mouth ventilation also expressed concerns regarding a greater responsibility to their own family to not get sick or pondered whether the hospital would take care of them for life if they acquired HIV.

Although we left the scenario of a homeless adult purposefully vague, they were the least likely persons in our survey to receive mouth-to-mouth rescue if they needed it. No physical description or health history was provided for these scenarios, so the unwillingness of health care professionals to do mouth-to-mouth resuscitation on this group reflects their personal biases about the homeless. Although most respondents gave no specific comments to this scenario, a few said they would not do mouth-to-mouth on the homeless because they were likely to have collapsed as a result of drug or alcohol abuse and therefore were in a higher risk group for HIV.

Lay Personnel

A previous study regarding mouth-to-mouth resuscitation highlights the fear of acquiring an infectious disease in both lay people and health care workers. In a post-course survey of predominantly lay people taking a four-hour CPR course in southern California,[3] it was found that although 92% would do CPR on a stranger, that percentage dropped to 32% if the rescuer was told that the collapsed victim had AIDS. Despite those results, other surveys suggest a substantial hesitancy to do mouth-to-mouth on an unknown victim. In a survey of both lay people and health care professionals in Arizona,[4] few of whom had CPR training, only 16% said they would do CPR on a stranger, but 74% would do it on a friend or relative who collapsed. This is consistent with our results in which 72% to 74% would do mouth-to-mouth on a known collapsed co-worker and 94% would do CPR on a spouse or parent.

Basic Life Support Providers

In a previous study, training in CPR did not notably increase the willingness of health care professionals to do mouth-to-mouth resuscitation. Instructors in basic life support were less likely to perform mouth-to-mouth resuscitation in scenarios in which HIV exposure was a possibility.[5] In a survey of 1,794 BCLS instructors, only 10% would do CPR on a person with heroin overdose, 18% on a man on a bus in San Francisco, and 29% on a man at a football game in New York City. But 97% would do it on a drowning child, and 54% would do it on a female college student. Of these BCLS instructors, 49% had actually done mouth-to-mouth resuscitation previously, and 40% of this subgroup would hesitate to do it again. They also stated that they had observed other BCLS providers hesitate to do CPR 40% of the time. In our study, previous providers of mouth-to-mouth resuscitation reported an increased willingness to do mouth-to-mouth.

Health Care Professionals

In a series of studies from southern California, a great unwillingness of health care professionals to do mouth-to-mouth resuscitation was suggested.[6–8] In a survey of internists and nurses in which cardiac collapses outside the hospital were described, only 5% of licensed vocational nurses, 10% of registered nurses, 16% of attending physicians, and 21% of resident physicians were willing to do mouth-to-mouth on a "well-dressed male in his mid-20s in a trendy bookstore in a gay neighborhood." The same group were more likely to do CPR on a man in a grocery store whom they never saw before (20% to 21% for nurses, 54% to 57% for physicians), and on a child who collapses (resident physicians 99%, attending physicians 81%, registered nurses 75%, and licensed vocational nurses 82%). With the exception of the low percentage of nurses in these studies who were willing to do mouth-to-mouth in the grocery store, our percentages for other scenarios appear similar, showing the same trend to hesitate with victims in less-known situations. Interestingly, an associated study showed that 92% of homosexual men surveyed at a gay restaurant or participating in an AIDS walk-a-thon were willing to provide mouth-to-mouth resuscitation on an unknown man.[7] The homosexual group would also do mouth-to-mouth on 95% of children. If the homosexual group were asked to provide mouth-to-mouth resuscitation if they themselves were HIV-positive, most would still provide it in 87% of all scenarios. It was speculated that the homosexual community, through aggressive education efforts, correctly believes that HIV is not transmissible through saliva.

It has been shown, however, that the same level of awareness about AIDS in physicians still makes them unlikely to do mouth-to-mouth resuscitation.[8] In a study in 1994 in which 74 house staff were surveyed at a Los Angeles teaching hospital, 33 (45%) were willing to do mouth-to-mouth on a 45-year-old heart attack victim, 29

(39%) were willing to do mouth-to-mouth on an elderly nursing home patient, 12 (16%) were willing to do mouth-to-mouth on a trauma patient with blood around his mouth, and only 5 (7%) were willing to do it on a 32-year-old man admitted to the hospital with fever, weight loss, and pneumonia. In this group, all respondents had both BCLS and ACLS training and might as a part of their duties be required to respond to an in-hospital CPR code. Although our questionnaire was less specific as to case descriptions, we found only a third of our physicians willing to provide mouth-to-mouth resuscitation to an unknown patient on a medical or surgical floor, but two thirds willing if they knew the patient to be HIV-negative. Physicians were more willing than nurses to come to the aid of an unknown co-worker who collapsed in the hospital. This was the only scenario in our study comparing physicians' and nurses' willingness to do mouth-to-mouth resuscitation that showed a statistical difference between physicians and nurse.

Physicians' Wish to Receive Mouth-to-Mouth Resuscitation

One of every five respondents in our survey did not wish to receive mouth-to-mouth resuscitation if they had a cardiac collapse. Of those who had done CPR before, 25% expressed a desire to not have it done on them. This correlates with results from other similar surveys. In a set of surveys of health care professionals at Stanford University Medical Center (Palo Alto, California), the request for a personal "no-code" was found to vary by level of training.[9,10] A no-code status was requested by 36% of medical students, 25% of nurses, 19% of resident physicians, and 13% of attending physicians. When this group was asked to suppose they had AIDS, the medical students wanted a no-code status 71% of the time, resident physicians 90% of the time, and attending physicians 87% of the time.

Similar results were found among 72 resident physicians surveyed in Portland, Oregon.[11] Although all respondents in the group wanted to be resuscitated if they had an acute myocardial infarction at age 40, only 28% would at age 80. No one in the group would want to be resuscitated if they were 80 years old and had any of the following: Alzheimer's disease, congestive heart failure, emphysema, or cirrhosis. Thirty percent would want to be resuscitated if they had AIDS at age 40, and 5% would want to be resuscitated with AIDS at age 80.

Are There Alternatives to Mouth-to-Mouth Resuscitation?

Mouth-to-mouth resuscitation is taught to more than 4 million people every year.[7] If all providers were to follow the recommendations from the Centers for Disease Control and Prevention and the American Heart Association and purchase a $3 personal pocket mask, it would cost $12 million. Many of our respondents claimed to have done just this in case they were needed to do mouth-to-mouth resuscitation outside the hospital. New York City has enacted a law placing such devices in public areas.[6] This might solve the problem of people's hesitating to do mouth-to-mouth resuscitation. In one study, a commercially available mask was used in a test broth containing the HIV virus. After the broth was ventilated through this mask, cultures for HIV remained negative after a month.[12] In a test of the ability to culture oral bacteria from pocket masks immersed in a broth of bacteria, all commercially available masks were found to be impermeable.[13] Six of eight commercially available barrier devices, however, failed to prevent the spread of oral flora to the rescuer side of the device.[13]

A few respondents in our survey insisted that in the hospital, resuscitation equipment should be immediately available. The cost of placing bag-valve-mask resuscitation equipment at each bedside would be exorbitant. Most patients who have a cardiac arrest in hospital end up waiting for the crash cart or code team to respond. But resuscitation rates from in-hospital arrest still have a 10% to 25% discharge rate[8] (our facility has a 16% survival-to-discharge rate), compared with out-of-hospital resuscitation rates of less than 10%. Further study is required to see if the immediate availability of bag-valve-mask devices increased the survival-to-discharge rate and if it justified the cost.

The time to respond with any type of resuscitation may be more important than the initiation of mouth-to-mouth. In Milwaukee, bystander CPR was not shown to improve discharged-alive rates,[14,15] whereas in Arizona it was thought to have an effect, with no successful resuscitations occurring unless bystander CPR was performed.[16] The results of one study of animals suggest that chest compressions without ventilations are as efficacious as standard CPR.[17] In Belgium, incorrect bystander CPR without ventilations produced a survival rate of 10%, whereas correct CPR with ventilations had a survival rate of 16%.[18]

We are encouraged that our results suggest a willingness by health care professionals to do mouth-to-mouth resuscitation. Bystander CPR will probably continue to be done for children, relatives, friends, and a few strangers. Although we encourage our health care professionals to use a pocket mask, the time may come that a health care professional must make a decision to provide mouth-to-mouth without one. Although the risk of AIDS transmission from CPR remains remote, it can never be said to be nonexistent if open wounds or blood contaminates the procedure. Whereas preliminary data suggest that even CPR without mouth-to-mouth ventilation is better than no CPR at all, we cannot advocate not providing mouth-to-mouth resuscitation when the need arises.

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REFERENCES

1. Cummins RO, editor. Textbook of advanced cardiac life support. New York (NY): American Heart Association; 1994

2. Roth R, Stewart RD, Rogers K, Cannon GM. Out-of-hospital cardiac arrest: factors associated with survival. Ann Emerg Med 1984; 13:237–243

3. Pane GA, Salness KA. A survey of participants in a mass CPR training course. Ann Emerg Med 1987; 16:1112–1116

4. Locke CJ, Berg RA, Sanders AB, Davis MF, Milander MM, Kern KB, et al. Bystander cardiopulmonary resuscitation: concerns about mouth-to-mouth contact. Arch Intern Med 1995; 155:938–943

5. Ornato JP, Hallagan LF, McMahon SB, Peeples EH, Rostafinski AG. Attitudes of BCLS instructors about mouth-to-mouth resuscitation during the AIDS epidemic. Ann Emerg Med 1990; 19:151–156

6. Brenner BE, Kauffman J. Reluctance of internists and medical nurses to perform mouth-to-mouth resuscitation. Arch Intern Med 1993; 153:1763–1769

7. Brenner BE. Willingness of male homosexuals to perform mouth-to-mouth resuscitation. Resuscitation 1994; 27:23–30

8. Brenner BE, Stark B, Kauffman J. The reluctance of house staff to perform mouth-to-mouth resuscitation in the in-patient setting: what are the considerations? Resuscitation 1994; 28:185–193

9. Varon J, Fromm RE, Sternbach GL, Combs AH. Discrepancy in resuscitation beliefs at various levels of training. Am J Emerg Med 1993; 11:290–292

10. Varon J, Sternbach GL, Rudd P, Combs AH. Resuscitation attitudes among medical personnel: how much do we really want to be done? Resuscitation 1991; 22:229–235

11. Hillier TA, Patterson JR, Hodges MO, Rosenberg MR. Physicians as patients: choices regarding their own resuscitation. Arch Intern Med 1995; 155:1289–1293

12. Don Michael A, Forrester JS. Mouth-to-mouth ventilation: the dying art. Am J Emerg Med 1992; 10:156–161

13. Cydulka RK, Connor PJ, Myers TF, Pavza G, Parker M. Prevention of oral bacterial flora transmission by using mouth-to-mask ventilation during CPR. J Emerg Med 1991; 9:317–321

14. Stueven H, Troiano P, Thompson B, Mateer JR, Kasterson EH, Tonsfeldt D, et al. Bystander/first responder CPR: ten years' experience in a paramedic system. Ann Emerg Med 1986; 15:707–710

15. Kowalski R, Thompson BM, Horwitz L, Stueven H, Aprehemian C, Darin JC. Bystander CPR in prehospital course ventricular fibrillation. Ann Emerg Med 1984; 13:1016–1020

16. Spaite DW, Hanlon T, Criss EA, Valenzuela TD, Wright AL, Keeley KT, et al. Prehospital cardiac arrest: the impact of witnessed collapse and bystander CPR in a metropolitan EMS system with short response times. Ann Emerg Med 1990; 19:1264–1269

17. Berg RA, Kern KB, Sanders AB, Otto CW, Hilwig RW, Ewy GA. Bystander cardiopulmonary resuscitation: is ventilation necessary? Circulation 1993; 88(pt I):1907–1915

18. Ornato JP. Should bystanders perform mouth-to-mouth ventilation during resuscitation? Chest 1994; 106:1641–1642